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(71) Applicant *(for all designated States except US)*: HANLEX LIMITED [GB/GB]; Blackhorse Road, Letchworth, Hertfordshire SG6 1HD (GB).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: COWAN, Michael, Anthony [GB/GB]; Hanlex Limited, Blackhorse Road, Letchworth, Hertfordshire SG6 1HD (GB).

(74) Agents: MOIR, Michael, Christopher et al.; Mathys & Squire, 100 Grays Inn Road, London WC1X 8AL (GB).

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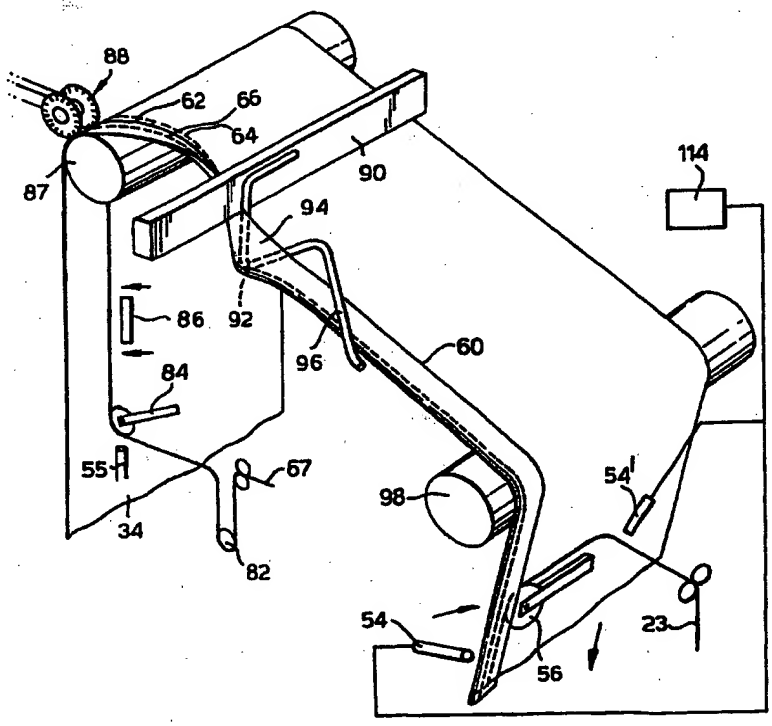
(57) Abstract

In a web–handling apparatus for a form–fill machine a blind header is formed by locally folding the web whilst the remainder of the web is maintained unfolded. Local fusing of a re–closable zipper strip at bag width intervals is achieved on a continuously moving web by means of sealing jaws which roll on the web. A tear strip may be introduced following delivery thereof whilst attached to the zipper strip. The zipper strip may have a characteristic e.g. an intermittent stripe which allows its movement to be sensed.



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METHOD AND APPARATUS FOR ATTACHING A STRIP TO A WEB OF PACKAGING MATERIAL

This invention relates to the manufacture of bags or packages from a web of plastics or other packaging material, especially in a form–fill machine. As used in this specification, the term bag where the context permits includes both a packet for liquid or fluent solid products eg. rice, peas, sweets etc., and a wrapper–type packet for a "blocky" product eg. cheese.

When intended for reclosure the bags each are provided with a folded blind header within which is a closure strip. When sold containing product the bag is complete and tamper–evident, but after opening of the blind header by the end–user, it can be re–closed by means of the closure strip.

It will be appreciated that the closure strip may have mechanically interengaging parts, or may employ another method by which the two halves of the strip join together eg. by adhesion. The term "conforming parts" and "engage" as used in the claims and elsewhere thus are to be given a broad interpretation, to apply to any pair of closure strip portions which detachably join together.

During manufacture of the bags, it is advantageous to monitor movement of the closure strip. Whilst monitoring for example rotation of a reel from which the strip is withdrawn may give a prima–facie indication of strip movement, it will not detect a malfunction downstream of the reel. Therefore an aspect of the invention consists in monitoring movement of the closure strip itself, preferably just after it is attached to the web, but alternatively at some other convenient station either before or after attachment.

Thus according to the invention there is provided a method of attaching a closure strip or other elongated strip to a moving web of packaging material (eg. of plastics) comprising sensing a characteristic of the moving strip which is indicative of such movement, and controlling the method in response thereto.

Also according to the invention there is provided a method of attaching a closure strip or other elongated strip to a moving web of packaging material comprising sensing a characteristic of the strip which varies along the length thereof as indicative of movement of the strip, and controlling the method in response thereto.

Preferably the characteristic is indicative also of the orientation of the strip.

Also according to the invention, there is provided apparatus for attaching a closure strip or other elongated strip to a moving web of packaging material (eg. of plastics) comprising means for sensing a characteristic of the moving strip which is indicative of such movement, and means for controlling the apparatus in response thereto.

The sensing means may be apparatus arranged to sense said characteristic after the strip is attached to the web.

There also may be means for determining the quantity of strip utilised by the apparatus from said characteristic.

Also according to the invention is a closure strip or other elongated strip for attachment to a web of plastics or other packaging material as part of a plastics bag or other package, the strip having a marker or other characteristic which varies along the length thereof.

The characteristic may vary cyclically or may be intermittent along the length of the strip. For example it may be a stripe which is interrupted at intervals or has a lateral dimension or a colour which varies along its length. The characteristic may be a lengthwise variation or interruption in the physical shape or dimension of the strip. It may be not normally visible to the human eye, and detectable for example when irradiated by non–visible radiation such as ultraviolet radiation.

Alternatively, the characteristic may be a lengthwise variation or interruption in the

physical shape or dimension of the strip.

The invention also provides a method of manufacturing a said strip comprising extruding the strip or conforming parts thereof, and imparting the varying characteristic by extrusion.

The invention further provides apparatus for manufacturing a said strip comprising means for extruding said strip or conforming parts thereof and means for imparting the varying characteristic by extrusion.

Preferably an element defining the varying characteristic is extended on to or co-extruded with the strip or a conforming part thereof.

A tear strip may be provided to assist the user to open the blind header. However, the provision of a tear strip, whilst appreciated by the end-user, complicates the procurement of raw materials by the form-fill machine operator since he must purchase both closure strip (zipper) and tear strip. Also the machine must be configured to accept reels of both consumables, and to feed them at the correct relative speeds. This leads to a more complicated and expensive apparatus. A preferred embodiment of the invention seeks to avoid or at least reduce this disadvantage.

Thus in another related aspect the invention provides a closure strip for a reclosable plastics bag as other package comprising elongate first and second conforming parts having profiles engageable with each other, each part being adapted to be secured to bag material, a said part carrying or having connected thereto a separable tear strip to be secured to the bag material spaced from the said part. The tear strip may have a characteristic varying along its length as set out above.

The tear strip may be carried by the said part by being formed integrally with or otherwise physically attached to the said part. The tear strip may be attached to

the said part by a thin web.

Alternatively the tear strip may be carried by the said part by mechanical engagement therewith. It may for example be carried in a groove or recess.

The tear strip may project from a surface of the said part so as to enable the orientation of the closure strip to be identified readily during manufacture of a reclosable plastics bag including the closure strip.

The tear strip may be of a different colour to the said part, enabling orientation of the closure strip to be identified readily during manufacture of a reclosable plastics bag including the closure strip. This facilitates the use of a closure strip which is more easily openable from above than below e.g. as in our published application EP0576269A. If such a closure strip is fitted upside down it becomes very difficult to open the bag from outside, but conversely internal pressure may cause it to open spontaneously.

Thus, preferably the varying characteristic is confined to a portion of the strip such as to be capable of indicating the orientation of the strip. Alternatively the strip may comprise an identifying element separate from the said characteristic which is positioned so that the orientation of the strip may be detected.

In a related aspect the invention provides a closure strip for a reclosable plastics bag of other package comprising elongate first and second conforming parts having profiles engageable with each other, at least one of said parts carrying an identifying element of a different material to that of the part, the identifying element being of different colour to the said part and being positioned so that the orientation of the closure strip is readily apparent.

The closure strip may be of a polyalkylene and the identifying element may be of EVA or other thermoplastic which will wet the surface of the strip and adhere thereto. A suitable material for use with a polypropylene closure strip is a hot melt

glue such as Beardow–Adams 150.

The invention also provides a method of manufacturing the closure strip as set forth above comprising extruding the said first and second parts, and applying the identifying element to a said extruded part. The identifying element may be extruded on to the said part.

Conventionally, a form–fill machine is fed with a web of plastics material which is folded edge–to–edge to permit the insertion into the fold of the mechanical closure or zipper strip. The conforming parts of the closure strip are then heat–sealed (welded) or otherwise fixed to the inside facing surfaces of the folded web.

In order to be accepted by the form–fill machine, the web has subsequently to be unfolded, leaving the blind header defined by the small portion of the web held in a folded shape by the engaging or conforming portions of the closure strip.

This procedure of folding and then unfolding the web requires a machine of considerable size, for example as shown in GB–A 2254038. The machine thus occupies significant factory space which could be put to better use.

A further aspect of the invention is directed to avoiding or at least reducing this disadvantage.

In this aspect the invention provides a method of forming in a moving web of plastics material a folded blind header containing a closure strip having conforming parts secured to opposing faces of the web within the fold, characterised by forming the header by locally folding the web without folding the remainder of the web.

The local fold may be at a region of the web spaced from the edges thereof.

Alternatively the local fold may be adjacent an edge of the web.

In one embodiment the method comprises effecting the local folding and then introducing the closure strip into the fold.

Alternatively, the method comprises affixing the conforming parts of the closure strip to the web on opposite sides of the fold line before effecting local folding.

A tear strip may be affixed along the fold line of the web either before or after it is folded.

The method may include perforating the web at intervals along two lines parallel and adjacent to but on opposite sides of the fold line.

In a related aspect the invention comprises apparatus for forming in a moving web of plastics material a folded blind header comprising means for supplying a closure strip having conforming parts, means for folding to form the web, means for securing the conforming parts to the web so that they are within the header, and characterised in that the means for folding the web is configured to effect said folding without folding the remainder of the web.

The means for folding the web may be configured to effect said folding at a region of the web spaced from its edges.

The means for folding the web may comprise means for constraining the moving web to remain unfolded except along a fold line whilst permitting displacement of the web laterally of its direction of movement, and means for laterally displacing the web locally into said fold along the fold line.

The constraining means may comprise plate structure defining a slot along the fold line.

The means for folding the web may comprise a forming bar disposed coaxially with the slot.

There may be a further forming bar coplanar with the first forming bar, the web passing between the forming bars.

The apparatus may comprise means for introducing the closure strip into the fold after it is formed; such means may be disposed within the slot.

According to another aspect of the invention there is provided a method of forming in a moving web of plastics material a blind header comprising a closure strip having conforming parts secured to opposing faces of the web within the header and a tear strip secured to a portion of the web within the header intermediate the conforming parts, characterised by providing a supply of the closure strip with the tear strip carried by or connected to a said part of the closure strip, and separating the tear strip from the said part whilst feeding the closure strip to be secured to the web.

In a related aspect the invention provides apparatus for forming in a moving web of plastics material a blind header comprising means for forming the web into a header, means for securing conforming parts of a closure strip to the web so that said parts are within the header, means for securing a tear strip to the web so that it is within the header between the said parts and characterised by means for supplying the closure strip with the tear strip carried by or connected to a said part, and means for separating the tear strip from the said part whilst the closure strip is fed to be secured to the web.

The means for forming the web may be configured to provide a local fold in a region of the web adjacent an edge thereof.

The web forming means may comprise means for displacing the web out of its plane along a fold line, and means for folding-over an edge portion thereby upstanding from said plane. Thus the web folding means may be a serpentine bar.

A further disadvantage of known machines is the intermittent step-wise advance of

the web due to the need to fuse–together the conforming parts of the closure strip together locally at bag–width intervals so that the finished bag does not leak where the closure strip intersects its side edges. The local fusing of the conforming parts is performed by stopping the web at a fusing station, effecting a fusing operation, advancing the web by one bag width and repeating the fusing step.

This restriction on the web speed limits the productivity of the downstream form–fill machine. A preferred embodiment of the present invention also is directed to eliminating or reducing this disadvantage.

Therefore the method of this aspect of the invention comprises locally fusing the conforming parts of the closure strip to each other at regularly spaced apart intervals whilst the web continues to move.

Said fusing may be effected by fusing means which roll upon the surface of the moving web or otherwise are stationary relative thereto during fusing.

The apparatus of the invention may comprise fusing means configured to perform fusing of the conforming parts as set forth above.

Thus another aspect of the invention provides apparatus for locally fusing–together at regularly spaced apart intervals conforming parts of a closure strip attached to a moving folded web, the apparatus comprising a pair of fusing members to effect said local fusing–together, means for passing the web between the fusing members, and means for moving the fusing members in the direction of movement of the web so that during said local fusing of the conforming parts the fusing members are stationary relative to the moving web.

The apparatus may comprise means for fusing apparatus the conforming parts of the closure strip to each other at regularly spaced apart intervals whilst the web continues to move.

The fusing means may comprise a pair of fusing members and means for moving the fusing members in the direction of the moving web so that during said local fusing of the conforming parts the fusing members are stationary relative to the web.

A said fusing member may rotatably mounted, or pivotally mounted for angular oscillation. The rotatable fusing member may comprise means for intermittently engaging the pivotable fusing member to effect angular oscillation thereof.

In yet another aspect the invention provides a method of manufacturing filled plastic bags comprising providing a web with a closure strip by means of a method or apparatus as set forth above, or a web comprising a closure strip as set forth above, said closure strip being disposed in a folded header portion of the web, joining opposing edges of the web together to form a tube, inserting or enclosing product of the tube, forming a seam across the bag, advancing the web by a bag–width interval and repeating the process.

In a further aspect the invention provides a method of manufacturing filled plastics bags comprising providing a web with a header by a method or by means of apparatus as set forth above, supplying the web to a form–fill machine, joining opposing side edges of the web together to form a tube, inserting or enclosing product in the tube, forming a seam across the bag, advancing the web by a bag–width internal and repeating the process.

When the web material is of laminated construction, one side edge thereof may be folded over so that the opposing side edges are presented for joining with surfaces of the same material facing each other. The opposing side edges may be joined adjacent one of the conforming parts of the closure strip.

Bags formed in this way have no bottom seaming and are of improved appearance. They are the subject of our co–pending application WO98/08739, the disclosure of which, to the extent not already herein set out, is incorporated by reference.

The invention will now be described merely by way of example with reference to the accompanying drawings wherein:

FIGURES 1 and 2 show a form filled bag, FIGURE 1 being a section on line 1–1 of FIGURE 2;

FIGURES 3, 4 and 5 are respectively side and end elevations and a plan view of part of apparatus according to the invention;

FIGURE 6 is a perspective view of the apparatus of FIGURES 3, 4, and 5;

FIGURE 7 shows a further part of apparatus according to the invention;

FIGURE 8 shows a header formed by another embodiment of the invention;

FIGURE 9 shows a section through a closure strip according to the invention which is used in the header of Figure 8;

FIGURES 10, 11, 12 and 13 show apparatus used in the manufacture of the header of Figure 8;

FIGURES 14 and 15 are sections through plastics bags according to the invention;

FIGURES 16 (a), (b) and (c) show alternative forms of closure strip according to the invention;

FIGURE 17 is a composite figure showing two forms of closure strip according to the invention;

FIGURES 18 and 19 show parts of other closure strips according to the invention;

FIGURE 20 shows apparatus for manufacturing a closure strip as shown in figure

17; and

FIGURE 21 shows a modified form of the apparatus of figure 13.

Referring to Figures 1 and 2, a resealable form-filled bag comprises a front 10 and back 12 resulting from forming a single web of thermoplastics material around the tube of a vertical form-fill machine. The bag has a seam 14 across one face of the bag, formed in the conventional way as a longitudinal seam in the machine direction. Side seams 16, 18 are formed in the cross-machine direction as successive bags are filled with product 20 and parted-off.

Before being presented to the form-fill machine the web is folded to form a blind header or closed top portion 22 below which conforming or otherwise engaging or adherent parts 24, 26 of a closure strip 23 are heat sealed (welded) to the opposing inner faces of the bag. Whilst the header 22 is intact the bag remains sealed and tamper-evident. To gain access to the contents the header is cut or torn off; thereafter the bag can be re-closed by means of the closure strip 23.

The thickness of the closure strip 23 is too great to be reliably sealed as part of the side seams 16, 18. Therefore it is necessary to compress and fuse the two parts 24, 26 of the closure strip together locally at bag-width intervals in a separate operation before the web is presented to the forming tube of the form-fill machine.

The web is then fed through the form-fill machine such that when the filled bags are cross-seamed and parted each locally fused area is cut into two parts 28, 30 so that an effective seal is provided at the ends of the closure strip of each bag.

Figures 3 to 6 show apparatus for forming the blind header in a more compact and elegant arrangement than hitherto achieved.

An unfolded web or film 34 is passed over a path roller 36 and thence still in its unfolded state beneath a pair of plates 38, 40 which are separated by a parallel-

sided gap or slot 41. Along the axis of this slot there is a disposed a forming bar 48 which extends parallel to but above the plane of the plates 38, 40. A second forming bar 44, co-planar with the bar 42 is disposed above the bar 42 and generally perpendicular thereto.

The web 34 passes beneath the end 46 of the bar 44 and above the bar 42, and thus is drawn upwards and laterally inwards assisted by convergingly-angled leading edges 47, 48 of the plates 38, 40 to form a local fold 50, the remainder of the web remaining unfolded. The bottom end 46 of the bar 44 is suitably rounded and shaped so that the web passes smoothly beneath it without local stretching.

The zip or closure strip 23 is fed with its two parts engaged around a tensioning pulley 56 beneath the slot 41 and thence into the folded portion of header 50 at a zipper insertion station 52. The web with the closure strip within the fold passes continuously through a conventional heat-sealing station 58 wherein the folded opposing walls of the web 34 are welded to the two halves of the closure strip. Thus a reclosable blind header is formed without the need as hitherto to fold the complete web edge-to-edge.

The speed of the web is measured by a rotation sensor attached to the path roller 36. An optical sensor 54 detects the presence of the closure strip 23 within the fold, and determines whether it is correctly orientated. As described later, the closure strip has a characteristic which varies along its length, eg. a stripe interrupted at intervals. Detection of the variations of this characteristic with time by the sensor 54 as the strip passes is indicative of movement thereof. Correlation of the detected variations with the speed of the web as detected from roller 36 provides a check that the machine is operating correctly.

If the correlation fails (eg. an interruption in the stripe occurs unexpectedly, or does not occur when expected), or if the strip 23 is detected as incorrectly orientated, the machine is shut down.

As an alternative or in addition to monitoring the strip 23 after it has been welded to the web, it may be monitored before the welding operation, eg. by means of an optical detector 54'. Whilst the correct arrival of the strip 23 thus can be ensured, there is no feedback that the welding of the strip has been properly completed. Thus sensing downstream of the welding station 58 is preferred.

The web then passes to an ultrasonic sealing station (Figure 7) in which the header portion 50 with the closure strip therein is passed through sealing jaws 60, 62. These jaws locally compress and fuse the conforming parts of the closure strip together at bag width intervals whilst the web 34 is continuously moving.

One of the jaws 60 is rotatably mounted and driven by a servomotor 61 the speed of which is controlled by a sensor (not shown) which measures the speed of the web. The jaw has an anvil portion 64 with an arcuate surface centred on the axis of rotation of the jaw. This surface defines with the other jaw 62 a closely-toleranced gap to compress the closure strip 23. The other jaw 62 is constructed as an ultrasonic horn, having a conventional ultrasonic generator 63 eg. as supplied by Kerry Ultrasonics Inc, but is mounted in a novel manner.

It is pivotally mounted for angular oscillation about an axis parallel to the axis of rotation of the jaw 60, and is driven intermittently so that the end 65 of jaw 62 is presented to the anvil 64 upon each rotation of the jaw 62. In a prototype version of the invention a follower 66 on the jaw 62 is intermittently engaged by a camming surface on the jaw 60 to drive the jaw 62 in synchronism therewith. Upon disengagement of the follower 66 the jaw 62 is returned by the action of a spring. In a production version of the device a more sophisticated drive eg. a stepper motor may be employed to drive the jaw 62 or alternatively the jaw 62 could be another rotary jaw similar to jaw 60 and driven by the same servo motor 61.

Each time the jaws 60, 62 are aligned the ultrasonic generator 63 is activated, heating the portion of header 50 and closure 23 strip then between them. The two

halves of the closure strip thus are compressed and fused together. Because the circumferential velocity of the anvil 64 is matched to the linear speed of the web, and the velocity of the end 65 of the jaw 62 is matched to that of anvil 64 there is no relative motion in the web direction between the operative surfaces of the jaws and the moving web during the compressing and fusing operation. That is to say the jaws roll on the web. When the anvil 64 departs from the web there is sufficient clearance for the jaw 62 to return to its starting position whilst the web continues to move. Thus intermittent fusing of the closure strip 54 is achieved at bag width intervals whilst the web is continuously moving.

Figure 8 shows another form of blind header according to the invention. In this case the web 34 is folded adjacent (e.g. about 50mm from) one of its edges 60 to form a folded blind header 22. The closure strip 23 is located about 25mm from the top of the header, whereat there is a tear strip (in this case a bead) 67 heat sealed along the fold line. The header has lines of weakness in the form of two lines of perforations 68 so that the bag embodying the header can easily be opened by pulling the tear strip. If the bag is required to be air-tight the lines of perforations may be replaced by narrow sections of web which are imperforate but thinner than the remainder, thereby providing lines of weakness.

The bead 67 was manufactured integrally with one of the conforming parts 24, 26 of the closure strip 23, and was separated therefrom as described hereafter. Figure 9 shows the one half 26 of the closure strip with the bead 67 attached thereto by a thin web 69, the whole having been produced as a single extrusion.

The closure strip 23 with its conforming parts assembled together and attached bead 67 are supplied on a convenient single reel 71, Figure 10. The strip is dispensed from the reel as required by the header-forming machine and passes over a tensioning roller 70 to a parting knife 72 (Figure 11) which separates the bead 67 by slitting the thin web 69. The separated bead and the closure profile then pass through separate profiled nips of a pair of rollers 74, and are fed to the subsequent stations of the machine as shown in Figure 12 and in more detail in

Figure 13.

Referring first to Figure 12, the web 34 is unwound from a supply reel 76, passes through a folding section 78 and thence to a zip insertion and heat-sealing station 80 similar to features 56, 58 of Figures 3 and 5.

Referring to Figure 13, the parted bead 67 is fed via a dancer roll 82 and turnover 84 to a heat-sealing station 86 where it is welded to the web 34 along the line at which the web is to be folded to form the header. The web passes over a roller 87 where it is pierced by wheels 88 to form the perforation lines 68 one each side of the bead 67.

The web passes under a spreader or smoothing bar 90 and its edge 60 is folded over on to the web to form the header 22.

Folding is achieved by depressing the web at the fold line by a knuckle portion 92 of a serpentine bar to provide an upstanding portion of web 94, then passing the upstanding portion of the web beneath an angled portion 96 of the bar which folds it against the main body of the web. The smoothing bar permits lateral movement of the web to permit its depression by the knuckle 92.

As an alternative to the knuckle portion, the web may be depressed by a roller or spreader bar the end of which lies along the fold line. The upstanding web portion 94 is then folded flat by a separate bar equivalent to the portion 96 of the serpentine bar.

Thus, in figure 21, the spreader bar 90 stops short at the line 91 along which the web is to be folded. An angled folding bar 93 folds the portion 94 of the web on to the main part thereof. Because the spreader bar 90 does not extend completely across the web, the need to depress the web by the knuckle 92 of figure 13 is avoided, and the serpentine bar can be dispensed with. Otherwise the apparatus of figure 21 is the same as that of figure 13.

The folded web then passes over a further roller 98 to the zipper insertion and sealing station 80 for insertion and sealing of the zipper 23. A sensor 54 or 54' is again provided, as discussed with reference to figure 3. If it is desired similarly to sense motion of the bead 67, a further similar sensor 55 may be provided to view the bead as it approaches the heat sealing station 86.

When the web is passed through the form–fill machine, the resulting filled bags are shown in Figure 14. It can be seen that the bottom seam 14 has been eliminated, and instead there is a welded lapped cross–seam 100 just below the closure strip. A bag of improved appearance results; the sealing station of the form–fill machine of course has to be displaced angularly around the form–fill tube to achieve this.

If the web is of laminated material then in order still to achieve a flush lapped seam, one of the edges of the web eg. 102 must be folded over as shown in Figure 15 during its passage through the folding station 78, so that like materials of the laminated material are presented to each other for welding. It will be appreciated that like materials are also face to face within the folded portion 102 so weld integrity is achieved through the thickness of the lapped seam.

The tear strip or bead 67 and perforations 68 may also be introduced into the bag of Figure 1. To this end, the machine of Figures 3 to 6 may incorporate the upstream bead–insertion and welding station 84, 86 and the perforating wheels 88. Alternatively the bead may be fed into the fold 50 just before the zip 23; in that event the zipper insertion station 52 would be used to insert the bead, with suitable adjustment of the height of the wheel 56, and a further similar insertion station provided just downstream for the zipper. Alternatively, the bead could be fed in through a groove in the top surface of the forming bar 42.

To avoid problems arising due to the differential cooling rates of the relatively small section bead 61 and the relatively massive section zipper parts 24, 26 it may be found preferable to separate the bead–sealing station from the zipper–sealing station ie. to place the zipper–sealing station significantly downstream of the bead–

sealing station. Thus application of the bead at stations 84, 86 before the web is folded is currently the preferred method.

The tear strip or bead 67 need not be formed integrally with or otherwise connected to the closure strip 23. It can instead be a separate element carried by the closure strip. Thus, referring to Figure 16, modified versions of the part 26 are shown having a groove or recess 104 in which is disposed a separate string-like tear strip 106. In Figures 16(a) and 16(b) the strip 106 is retained by the re-entrant shape of the groove or recess. The strip is removed by a blunt knife which strips (pulls) it through the opening of the recess, the material (eg. polyethylene) of the part 26 being sufficiently flexible to permit this.

In Figure 16(c) the strip 106 is received and retained in an open groove 104 by a non-aggressive adhesive. Alternatively the strip may be carried in one of the grooves 108 which are part of the conforming profile of the part 26. The groove 106 of course then need not be provided, but the closure parts 24, 26 have to be brought together at an additional machine station after the string has been removed.

The string 106 may be of a different material to that of the part 26, eg. polypropylene. It may also be of a different colour so that it, and the orientation of the closure strip during manipulation thereof eg. when the machine is being set-up can easily be seen. It will be appreciated that the closure strip is of a small section eg. with a section of no more than 2mm x 1mm, but as already explained must be installed the correct way up. Thus an aid to ready identification of the orientation of the closure strip is of value.

If the strip 106 is carried in one of the profile grooves 108, its orientation-indicating function may not be achieved. Then it may be found convenient to provide a strip of different material of a different colour along an edge eg. the top edge of one or both of the parts 24, 26, as shown in Figure 17. In this example, a stripe 110 of EVA (ethylene/vinyl acetate) dyed a contrasting colour to the polyethylene closure strip parts 24, 26 is extruded into a groove on the top of strip

part 26.

Figure 17 also shows an alternative configuration which allows the sensor 54 (figures 3 and 13) easily to detect movement of the closure strip. Here, an intermittent stripe 112 of EVA is laid down in a groove on the top of closure part 24, closure part 26 either being similarly marked in phase with the markings on closure part 24 or left unmarked.

The optical sensor 54 senses the intermittent stripe 112 and produces a pulsiform output to a CPU or other control equipment 114 (figure 13) which controls the operation of the apparatus shown in the figures, the form–fill machine to which the web is supplied, and the source of product which is to fill the bags in the form–fill machine. If the CPU 114 fails to receive the pulsiform signal from the sensor 54, or if its frequency is wrong (implying that the closure strip is moving at the wrong speed) then a malfunction is indicated and the CPU shuts–down the production line.

Referring to Figure 18, a male portion 120 of a zipper strip has a base flange 122 by which it is to be welded to the web. One edge 124 of the flange 122 has notches 126 at intervals thereby providing discontinuities or markers which can be sensed by the sensor 54, or by an equivalent (eg. mechanical or capacitive) device responsive to the absence of flange material in the notches. The notches are relatively widely spaced relative to their width so that they may be more easily sensed. Alternatively they are relatively wide and interspersed by relatively wide lands. That is to say it is preferable that they are not in the nature of saw–tooth or serrated edges to the flange.

Figure 19 shows a female portion 130, a zipper strip having indents 132 in the base of the strip which is to be welded to the web. The indents can be sensed by a suitable optical or other sensor, especially if a material of a contrasting colour is deposited in them.

Other forms of marking or interruption of the lengthwise continuity of the strip may be adopted to provide the closure strip with a motion-revealing characteristic. For example the intermittent stripe may be printed on to the strip by a conventional (e.g. ink-jet) printing method, or a more complex repeating pattern may be employed, or the strip could be bar-coded at regular intervals. This last, or other distinctive pattern, can be employed to indicate other information about the strip for example its dimensions, specification, origin etc, any of which can be checked by the CPU when read by an appropriately selected optical sensor (e.g. a bar code reader for a bar coded stripe).

The closure strip need not have a visually-recognisable characteristic. For example it could be marked with UV-fluorescent material which is invisible to the human eye and thus does not compromise the appearance of the end product. The marking need not be a regular pattern provided that the CPU can apply a reliable test to the output from the sensor 54. For example a random pattern is sufficient provided that it is such that it ensures that the sensor 54 detects a change in state at not less than a predetermined time after the last change.

Alternatively and in addition the tear strip 67, 106 may be provided with a detectable characteristic e.g. by printing as described above, or in the case of the separate tear string 106 by twisting it from two polypropylene threads of contrasting colours so that the resulting string has a helical stripe, passage of which can be sensed by the sensor. Alternatively it may be made of varying cross-section eg. of alternating thick and thin sections by passing it through a profiled roller whilst still deformable following extrusion, the variation in section being detectable by a suitable sensor. If only the tear strip and not the closure strip has a detectable characteristic, then the sensor 54 is moved to upstream of the parting knife 72 (figure 11). If both the tear strip and the closure strip have motion-revealing characteristics, then sensors 54 and 55 may be used as shown in figure 13.

Although figure 17 shows the stripe as being interrupted at relatively frequent

intervals, in practice a relatively long interruption interval may be adopted, for example once every several metres, provided the controller 114 is appropriately instructed. The interruption interval may also be relatively long; in a prototype example the stripe 112 is interrupted for approximately 75mm once every ten metres.

Infrequent interruptions permit relatively simple arrangements for providing the stripe 112. In figure 20, a closure strip extrusion apparatus includes a heater 140 to supply molten closure strip material such as polypropylene to a die 142 having two profiled nozzles for producing the two halves 24, 26 of the closure strip. The extruded strip portions 24, 26 pass through a thermostatically controlled water bath 144, through a vacuum drier 146 to rollers 148 which bring the now-cold portions into engagement after which they are wound onto a storage reel 150.

The apparatus is conventional except that the die 142 is modified to co-extrude a coloured marker strip 112 onto the strip portion 24, by pump and heater 151 via a valve 152. The valve is closed briefly at regular intervals by means of a timer so that an interruption is caused in the strip 112.

Alternatively the strip 112 may be laid down continuously, but a UV-fluorescent marker is introduced into the molten marker strip material via the valve 152 from a suitable source 154. The supply of UV material is periodically interrupted by the valve 152 to provide the necessary lengthwise - varying characteristic to the closure strip. The valve 152 is as close as possible to the die 142 so that the transition in the marker stripe from present to absent and vice versa is as well-defined as practicable.

Whilst this preferred method provides a normally-present marker, it will be appreciated that if desired the marker may be normally absent, and may be deposited only transiently at intervals. The functional effect is the same, so far as concerns sensing movement of the strip, but the orientation of the strip cannot be monitored continuously unless the marker is deposited frequently. Some savings of

marker material will result.

Each feature disclosed in this specification (which term includes the claims) and/or shown in the drawings may be incorporated in the invention independently of other disclosed and/or illustrated features.

The text of the abstract filed herewith is repeated here as part of the specification.

In a web-handling apparatus for a form-fill machine a blind header is formed by locally folding the web whilst the remainder of the web is maintained unfolded. Local fusing of a re-closable zipper strip at bag width intervals is achieved on a continuously moving web by means of sealing jaws which roll on the web. A tear strip may be introduced following delivery thereof whilst attached to the zipper strip. The zipper-strip may have a characteristic e.g. an intermittent marking which allows its movement to be sensed.

CLAIMS

1. A method of attaching a closure strip or other elongated strip to a moving web of packaging material comprising sensing a characteristic of the moving strip which is indicative of such movement, and controlling the method in response thereto.

2. A method of attaching a closure strip or other elongated strip to a moving web of packaging material comprising sensing a characteristic of the strip which varies along the length thereof as indicative of movement of the strip, and controlling the method in response thereto.

3. Apparatus for attaching a closure strip or other elongated strip to a moving web of packaging material comprising means for sensing a characteristic of the moving strip which is indicative of such movement, and means for controlling the apparatus in response thereto.

4. Apparatus as claimed in claim 3 wherein the sensing means is arranged to sense said characteristic after the strip is attached to the web.

5. Apparatus as claimed in claims 3 and 4 comprising means for determining the quantity of strip utilised by the apparatus from said characteristic.

6. Apparatus as claimed in any of claims 3 to 5 wherein the characteristic of the strip varies along the length thereof.

7. Apparatus or a method as claimed in any preceding claims wherein the characteristic varies cyclically or is intermittent along the length of the strip.

8. A closure strip or other elongated strip for attachment to a web of material as part of a bag or other package, the strip having a characteristic which varies along the length thereof.

9. A strip as claimed in claim 8 wherein the varying characteristic is confined to a portion of the strip such as to be capable of indicating the orientation of the strip.

10. A strip as claimed in claims 8 or 9, wherein the strip comprises an identifying element separate from the said characteristic which is positioned so that the orientation of the strip may be detected.

11. A strip as claimed in claims 8, 9 or 10 wherein the characteristic varies cyclically or is intermittent along the length of the strip.

12. A strip as claimed in any of claims 8 to 11 wherein the characteristic is a repeating pattern.

13. A strip as claimed in any of claims 8 to 12 wherein the characteristic is a stripe which is interrupted at intervals or has a lateral dimension or a colour which varies along its length.

14. A strip as claimed in any of claims 8 to 12 wherein the characteristic is a lengthwise variation or interruption in the physical shape or dimension of the strip.

15. A strip as claimed in any of claims 8 to 13 wherein the varying characteristic is not normally visible to the human eye.

16. A strip as claimed in claim 15 wherein the varying characteristic is detectable when irradiated by non-visible radiation.

17. A strip as claimed in claim 16 wherein the varying characteristic is detectable when irradiated with ultraviolet radiation.

18. A closure strip for a reclosable bag or other package comprising elongate first and second conforming parts having profiles engageable with each other, at

least one of said parts carrying an identifying element of a different material to that of the part, the identifying element being of different colour to the said part and being positioned so that the orientation of the closure strip is readily apparent.

19. A closure strip as claimed in claim 18 wherein the said part has a groove or recess in which the identifying element is disposed.

20. A closure strip as claimed in claims 18 or 19 wherein the closure strip is of a polyalkylene and the identifying element is of EVA.

21. A method of manufacturing the closure strip of claims 18, 19 or 20 comprising extruding the said first and second parts, and applying the identifying element to a said extruded part.

22. A method as claimed in claim 21 comprising extruding the identifying element on to the said part.

23. A closure strip for a reclosable bag or other package comprising elongate first and second conforming parts having profiles engageable with each other, each part being adapted to be secured to web material, a said part carrying or having connected thereto a separable tear strip to be secured to the web material spaced from the said part.

24. A closure strip as claimed in claim 23, wherein the tear strip is integrally formed with or otherwise physically attached to the said part.

25. A closure strip as claimed in claim 24 wherein the tear strip is attached to the said part by a thin web.

26. A closure strip as claimed in claims 24 or 25 wherein the tear strip projects from a surface of the said part so as to enable the orientation of the closure strip to be identified readily during manufacture of a reclosable bag or package including

the closure strip.

27. A closure strip as claimed in claim 23 wherein the tear strip is carried by the said part by mechanical engagement therewith.

28. A closure strip as claimed in claim 27 wherein the tear strip is carried in a groove or recess of the said part.

29. A closure strip as claimed in any of claims 23 to 28 wherein the tear strip is of a different colour to the said part, enabling orientation of the closure strip to be identified readily during manufacture of a reclosable bag or package including the closure strip.

30. A closure strip as claimed in any of claims 23 to 29 wherein the tear strip has a characteristic which varies along the length thereof.

31. A method of forming in a moving web of plastics material a folded blind header containing a closure strip having conforming parts secured to opposing faces of the web within the fold, characterised by forming the header by locally folding the web without folding the remainder of the web.

32. A method as claimed in claim 31 wherein the local fold is at a region of the web spaced from the edges thereof.

33. A method as claimed in claim 31 wherein the local fold is adjacent an edge of the web.

34. A method as claimed in claims 31, 32 or 33 comprising effecting the local folding and then introducing the closure strip into the fold.

35. A method as claimed in claims 31, 32 or 33 comprising affixing the conforming parts of the closure strip to the web on opposite sides of the fold line

before effecting local folding.

36. A method as claimed in any of claims 31 to 35 comprising affixing a tear strip to the web along the fold line.

37. A method as claimed in claim 36 comprising affixing the tear strip to the web before it is folded.

38. A method as claimed in any preceding claim comprising perforating the web at intervals along two lines parallel and adjacent to but on opposite sides of the fold line.

39. A method of forming in a moving web of plastics material a blind header comprising a closure strip having conforming parts secured to opposing faces of the web within the header and a tear strip secured to a portion of the web within the header intermediate the conforming parts, characterised by providing a supply of the closure strip with the tear strip carried by or connected to a said part of the closure strip, and separating the tear strip from the said part whilst feeding the closure strip to be secured to the web.

40. A method as claimed in claim 39 wherein the tear strip is carried by the said part by being formed integrally with or otherwise physically attached to the said part.

41. A method as claimed in claim 39 wherein the tear strip is attached to the said part by a thin web.

42. A method as claimed in claim 40 wherein the tear strip is carried by the said part by mechanical engagement therewith.

43. A method as claimed in claims 40 and 42 wherein the tear strip is carried in a groove or recess in the said part.

44. A method as claimed in any of claims 31 to 43 comprising locally fusing the conforming parts of the closure strip to each other at regularly spaced apart intervals whilst the web continues to move.

45. A method as claimed in claim 44 comprising effecting said fusing by fusing means which roll upon the surface of the moving web or otherwise are stationary relative thereto during fusing.

46. Apparatus for forming in a moving web of plastics material a folded blind header comprising means for supplying a closure strip having conforming parts, means for folding to form the web, means for securing the conforming parts to the web so that they are within the header, and characterised in that the means for folding the web is configured to effect said folding without folding the remainder of the web.

47. Apparatus as claimed in claim 46 wherein the means for folding the web is configured to effect said folding at a region of the web spaced from its edges.

48. Apparatus as claimed in claim 46 or 47 wherein the means for folding the web comprises means for constraining the moving web to remain unfolded except along a fold line whilst permitting displacement of the web laterally of its direction of movement, and means for laterally displacing the web locally into said fold along the fold line.

49. Apparatus as claimed in claim 48 wherein the constraining means comprises plate structure defining a slot along the fold line.

50. Apparatus as claimed in claim 49 wherein the means for folding the web comprises a forming bar disposed coaxially with the slot.

51. Apparatus as claimed in claim 50 wherein the means for folding the web also comprises a further forming bar coplanar with the first forming bar, the web

passing between the forming bars.

52. Apparatus as claimed in claims 49, 50 or 51 comprising the means for introducing the closure strip into the fold after it is formed.

53. Apparatus for forming in a moving web of plastics material a blind header comprising means for forming the web into a header, means for securing conforming parts of a closure strip to the web so that said parts are within the header, means for securing a tear strip to the web so that it is within the header between the said parts and characterised by means for supplying the closure strip with the tear strip carried by or connected to a said part, and means for separating the tear strip from the said part whilst the closure strip is fed to be secured to the web.

54. Apparatus as claimed in claim 53, being also apparatus as claimed in any of claims 46 to 52.

55. Apparatus as claimed in claim 53 wherein the means for forming the web is configured to provide a local fold in a region of the web adjacent an edge thereof.

56. Apparatus as claimed in claim 53 wherein the web forming means comprises means for displacing the web out of its plane along a fold line, and means for folding over an edge portion thereby upstanding from said plane.

57. Apparatus as claimed in any of claims 53 to 56 wherein the means for affixing the tear strip to the web is arranged to affix the tear strip along a fold line.

58. Apparatus as claimed in claim 57 wherein the means for affixing a tear strip is disposed upstream of the web forming means.

59. Apparatus as claimed in any of claims 53 to 58 comprising means for perforating the web at intervals along two lines parallel and adjacent to but on opposite sides of the fold line.

60. Apparatus as claimed in any of claims 46 to 59 comprising means for fusing the conforming parts of the closure strip to each other at regularly spaced apart intervals whilst the web continues to move.

61. Apparatus as claimed in claim 60 wherein the fusing means comprises a pair of fusing members and means for moving the fusing members in the direction of the moving web so that during said local fusing of the conforming parts the fusing members are stationary relative to the web.

62. Apparatus for locally fusing–together at regularly spaced apart intervals conforming parts of a closure strip attached to a moving folded web, the apparatus comprising a pair of fusing members to effect said local fusing–together, means for passing the web between the fusing members, and means for moving the fusing members in the direction of movement of the web so that during said local fusing of the conforming parts the fusing members are stationary relative to the moving web.

63. Apparatus as claimed in claim 61 or claim 62 wherein the fusing members are mounted so as to roll on the moving web.

64. Apparatus as claimed in claim 63 wherein a said fusing member is rotatably mounted.

65. Apparatus as claimed in claim 64 wherein a said fusing member is pivotally mounted for angular oscillation.

66. Apparatus as claimed in claims 64 and 65 wherein the rotatable fusing member comprises means for intermittently engaging the pivotable fusing member to effect angular oscillation thereof.

67. A method of manufacturing a strip as claimed in claim 8 comprising extruding the strip or conforming parts thereof, and imparting the varying

characteristic by extrusion.

68. A method as claimed in claim 67 comprising extruding on to or co-extruding with the strip or the conforming part thereof an element so as to define varying characteristic.

69. Apparatus for manufacturing a strip as claimed in claim 8 comprising means for extruding the strip or conforming parts thereof and means for imparting the varying characteristic by extrusion.

70. Apparatus as claimed in claim 69 wherein the imparting means comprises means for extruding on to or co-extruding with the strip or conforming part thereof an element so as to define the varying characteristic.

Fig.1.

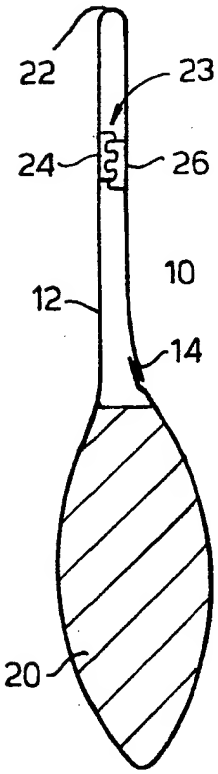

Fig.2.

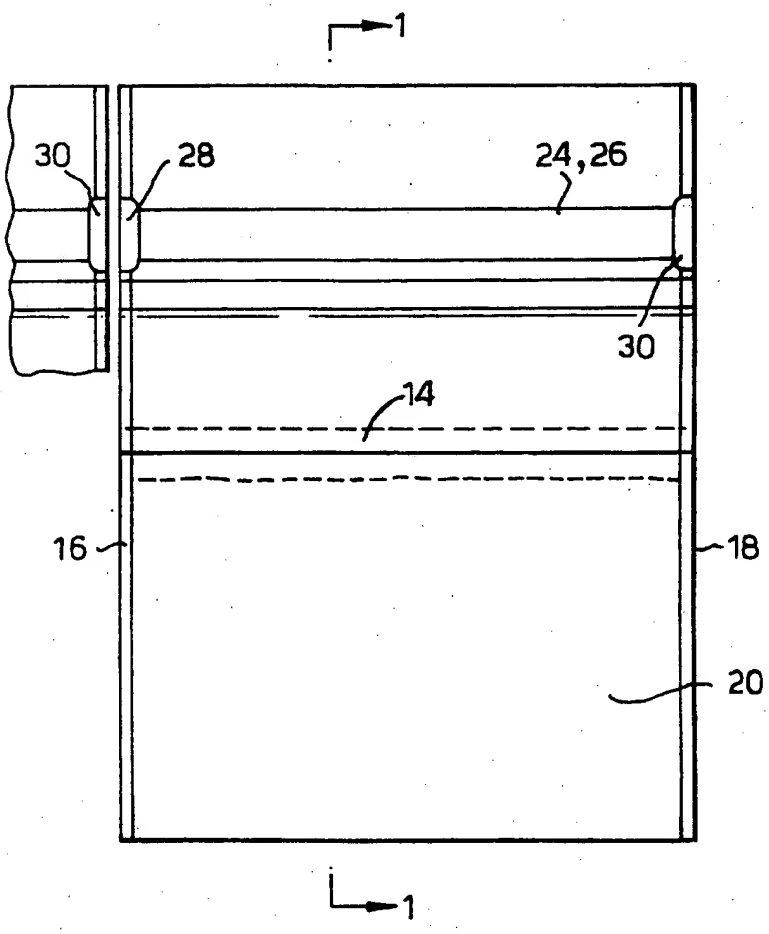

Fig.4.

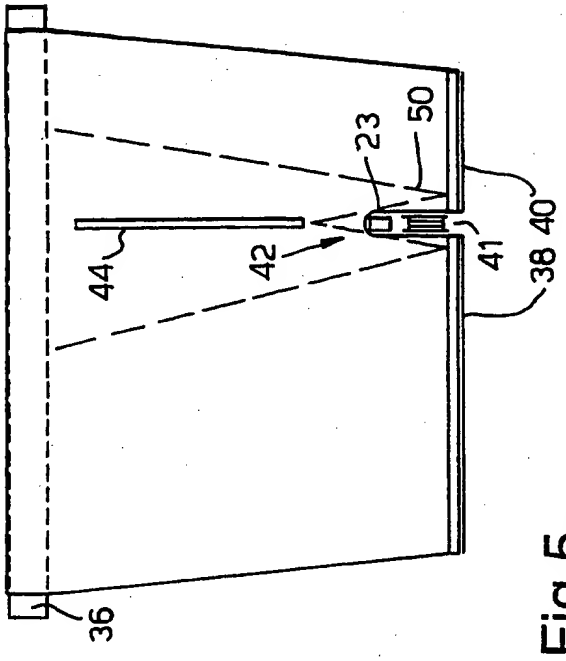

Fig.5.

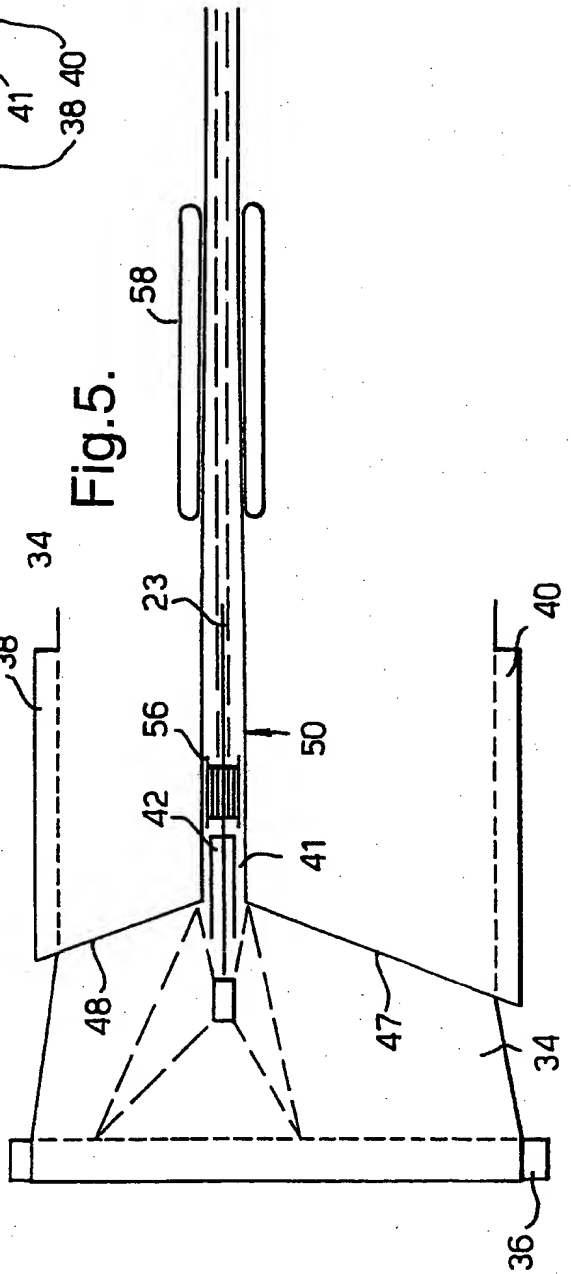

Fig.3.

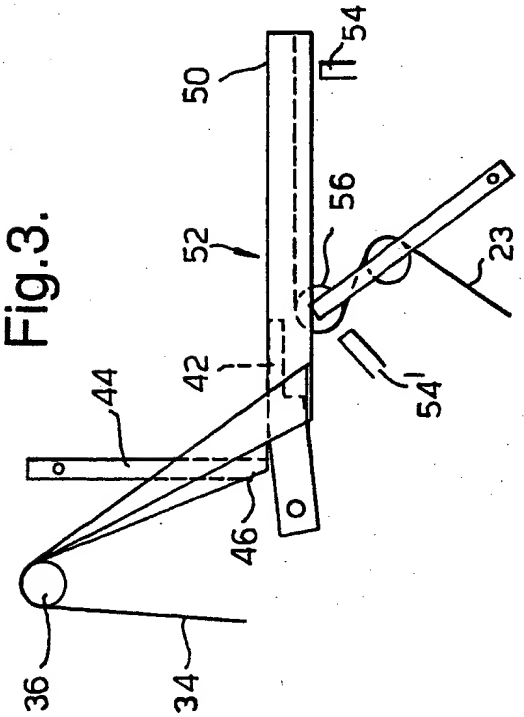

Fig.6.

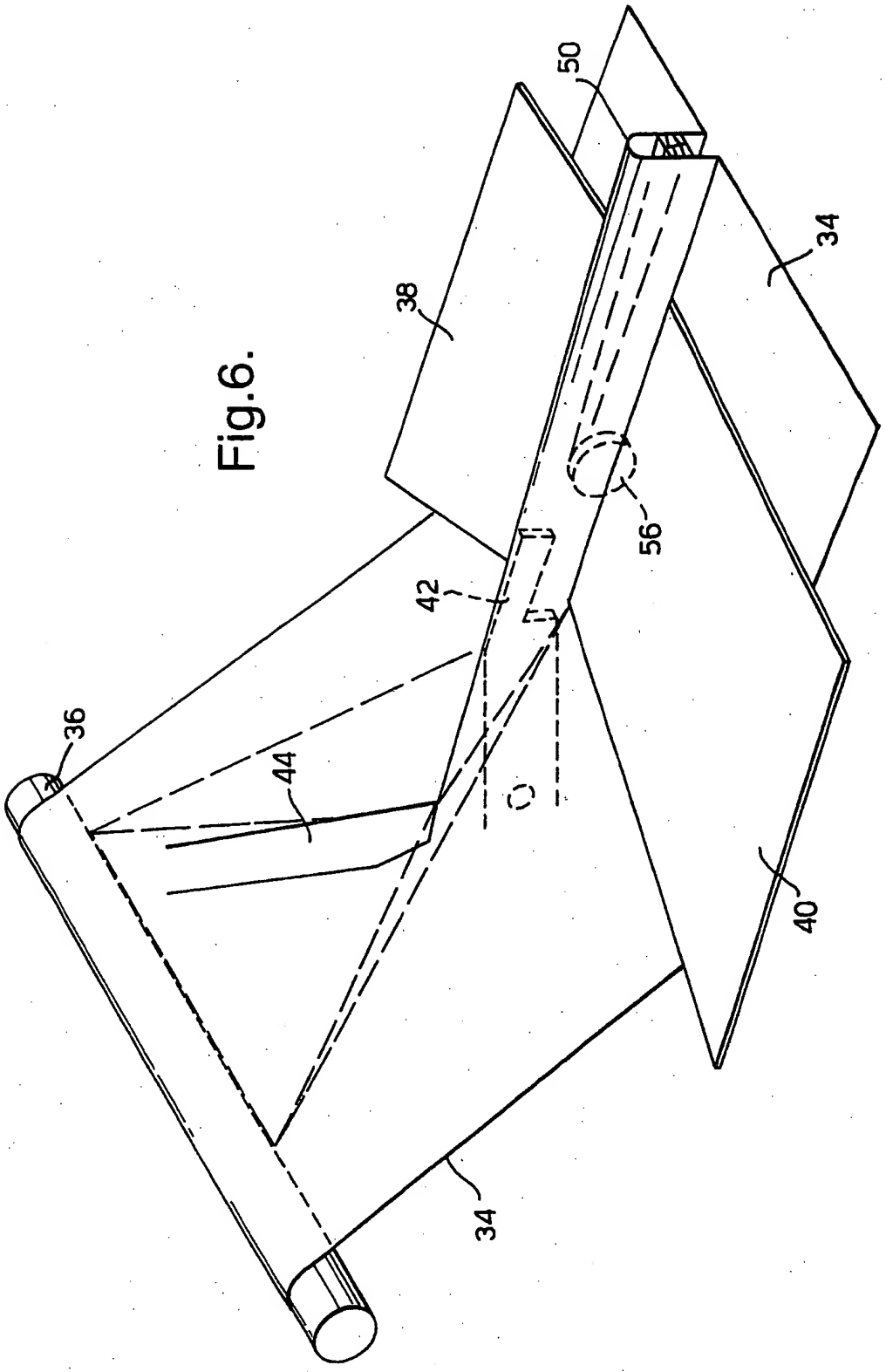

Fig.7.

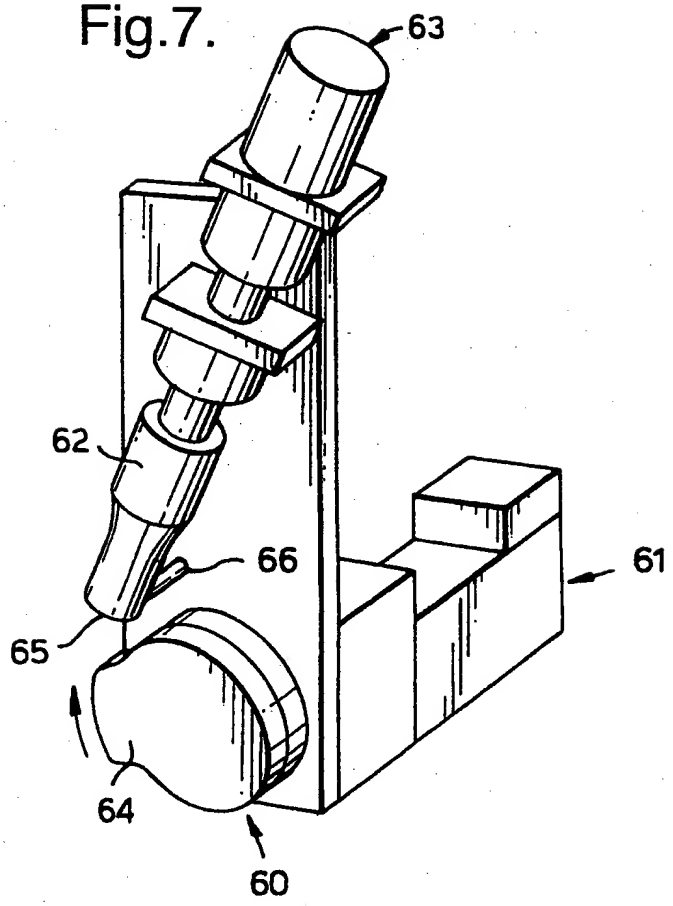

Fig.8.

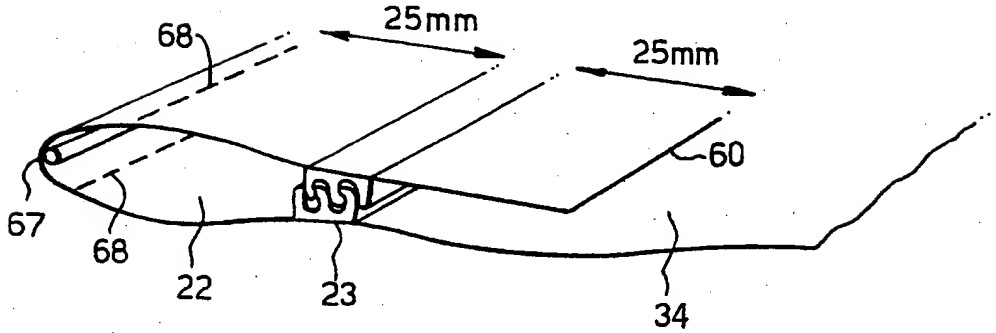

Fig.9.

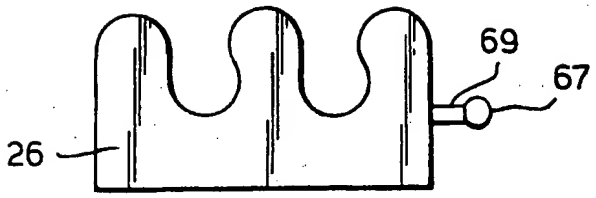

Fig.10.

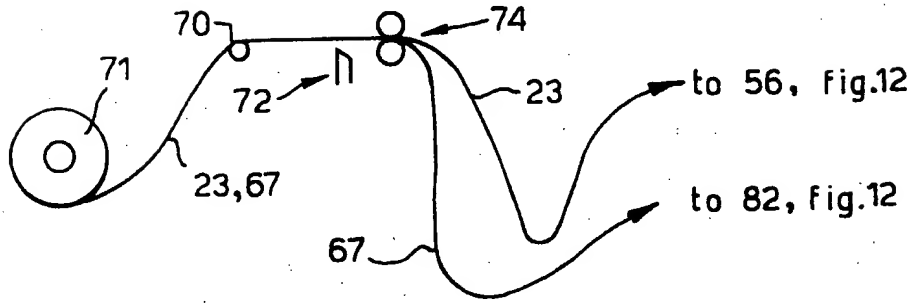

Fig.11.

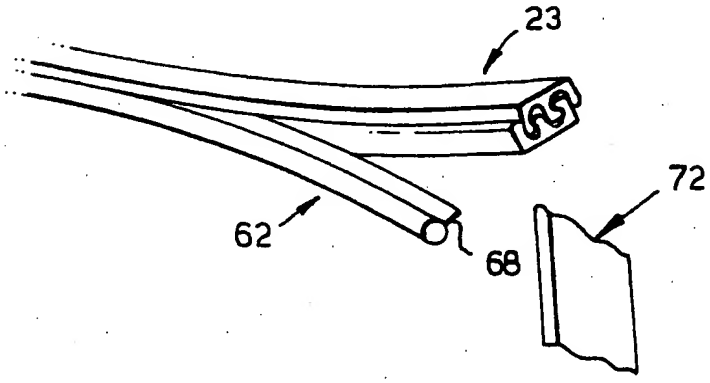

Fig.12.

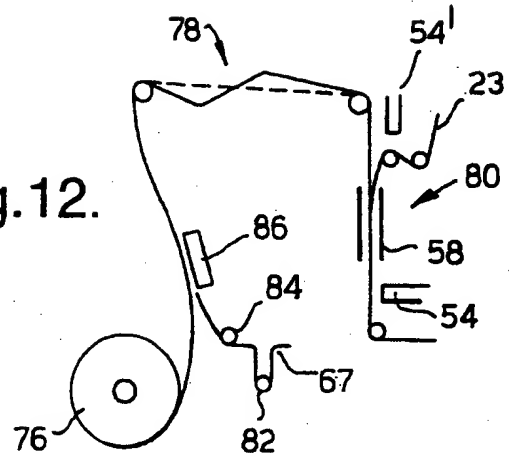
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Fig.13.

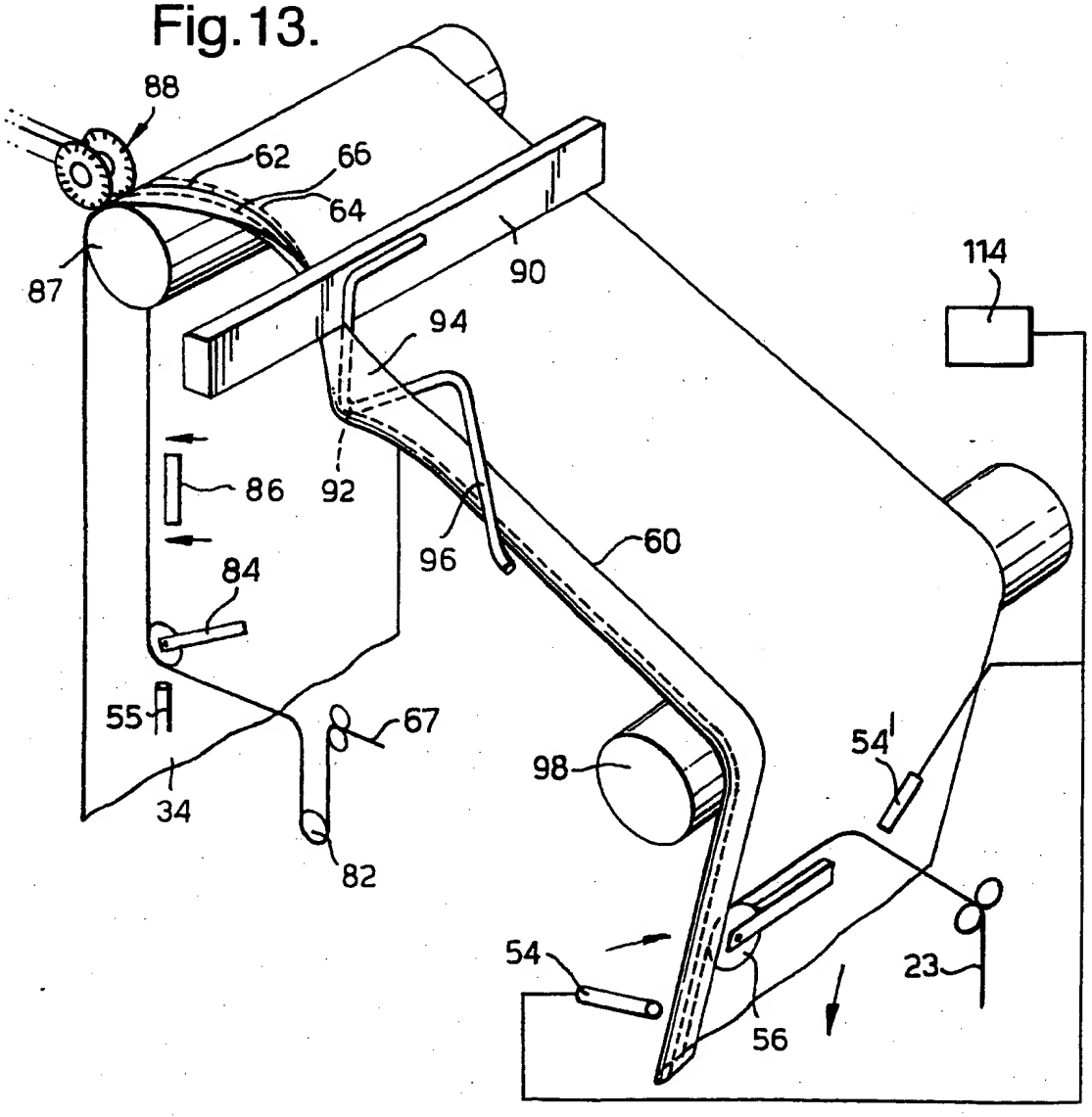
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Fig.14.

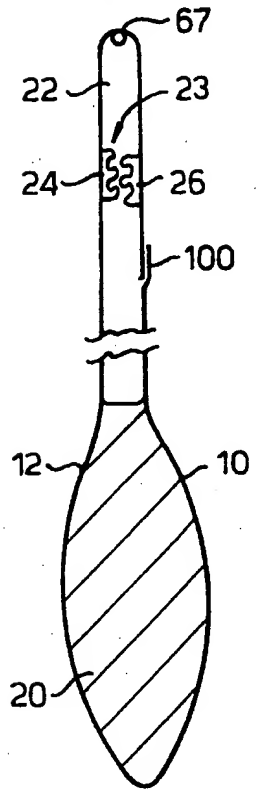


Fig.15.

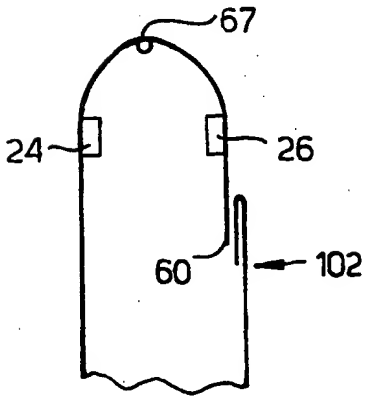


Fig.16a.

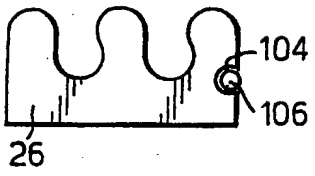


Fig.16b.

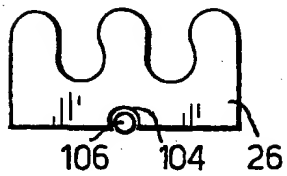


Fig.16c.

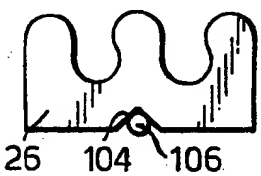


Fig.17.

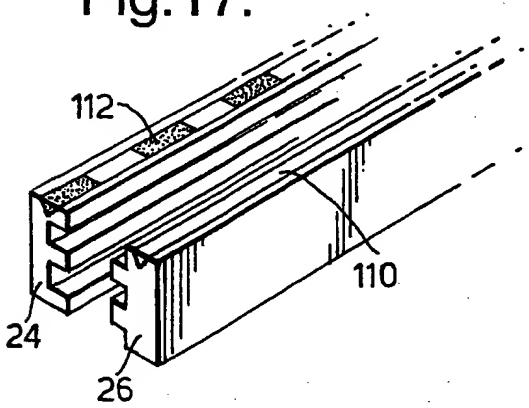


Fig.18.

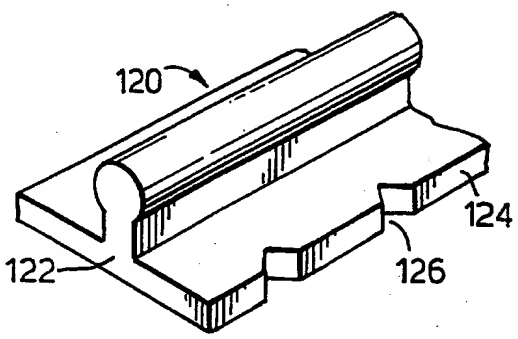


Fig.19.

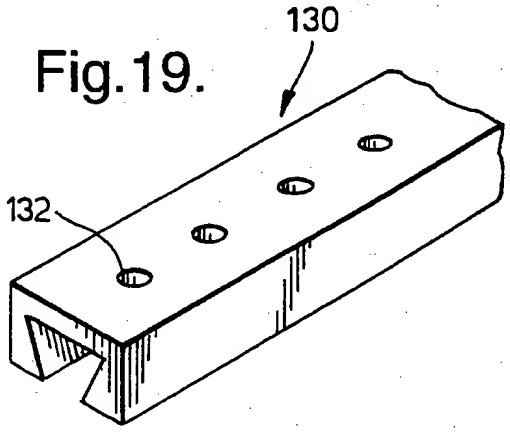


Fig.20.

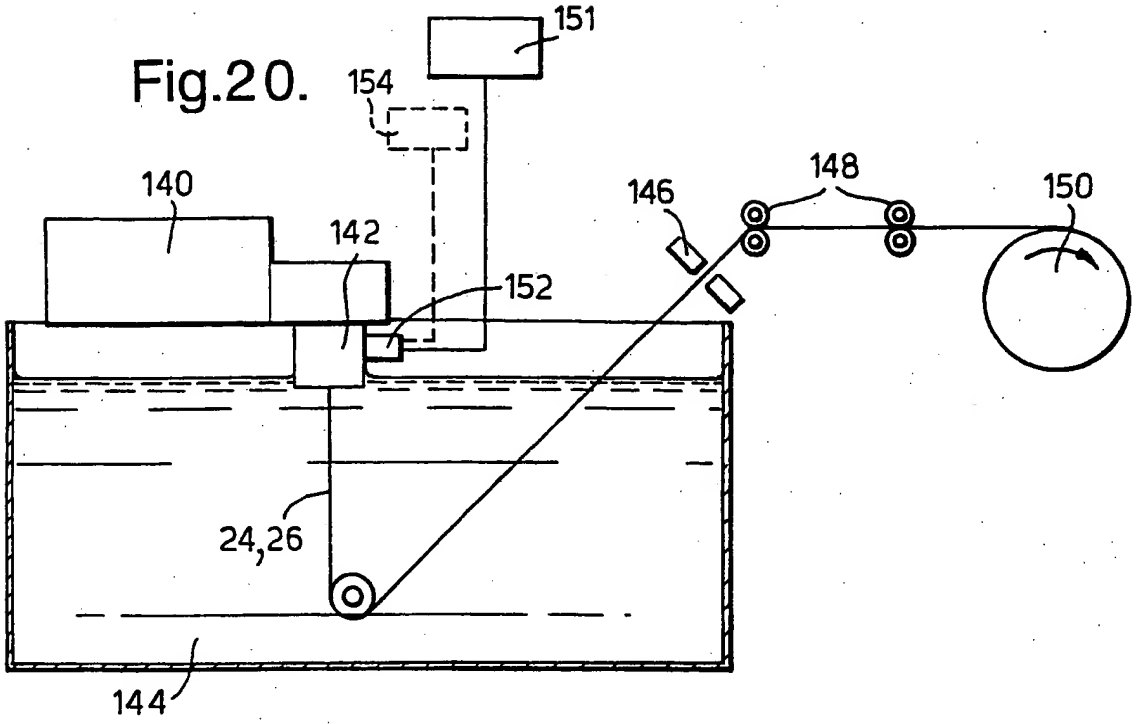
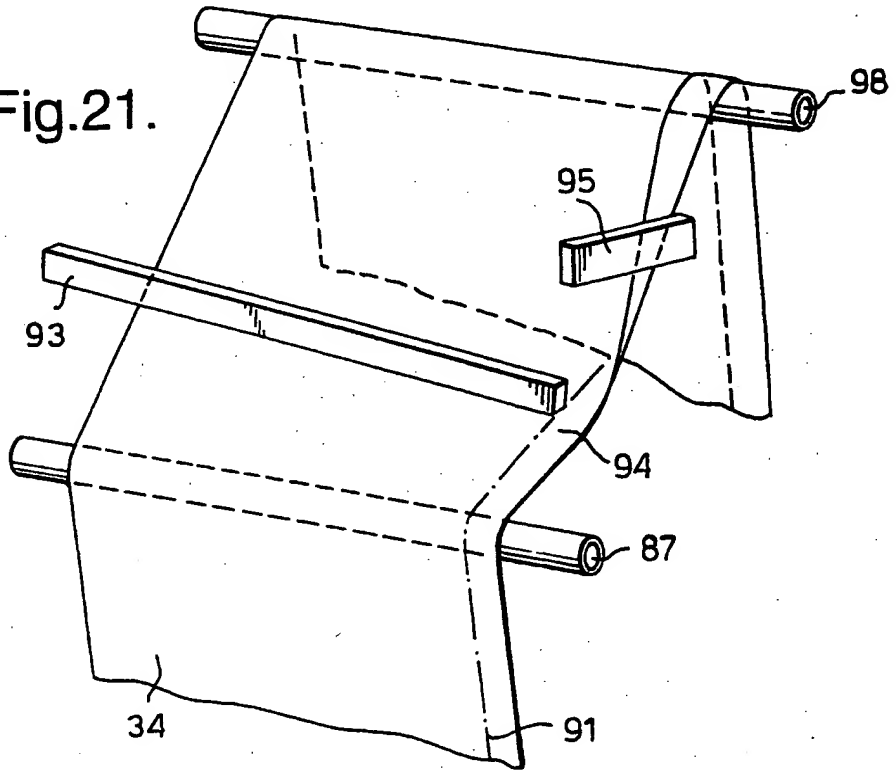


Fig.21.



INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 98/01201

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65B61/18 B31B19/90

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B65B B31B B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 481 783 A (REYNOLDS CONSUMER PRODUCTS) 22 April 1992	1-3,6-8, 11,12, 23-28, 30, 39-44, 53, 55-58,60
Y	see column 8, line 54 - column 12, line 41 see column 20, line 30 - column 21, line 23; figures	61-64
A		18,21, 67,69

X	US 4 876 842 A (S. AUSNIT) 31 October 1989	1,3,4,7
A	see column 2, line 40 - column 4, line 54; figures	10-14, 18,31,46

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 August 1998	17/08/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Jagusiak, A

1

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 98/01201

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 555 282 A (SEISAN NIPPON) 26 November 1985	61-64
A	see column 6, line 2 - column 7, line 65; figures 1-4	21,67,69
A	FR 2 586 650 A (FLEXICO-FRANCE) 6 March 1987	
A	EP 0 531 701 A (KRAFT GENERAL FOODS) 17 March 1993	

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

In ational Application No
PCT/GB 98/01201

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 481783 A	22-04-1992	US 5046300 A	10-09-1991
		US 5127208 A	07-07-1992
		CA 2053602 A	20-04-1992
		DE 69107009 D	09-03-1995
		DE 69107009 T	24-05-1995
		JP 5178302 A	20-07-1993
		US 5215380 A	01-06-1993
US 4876842 A	31-10-1989	NONE	
US 4555282 A	26-11-1985	JP 1384843 C	26-06-1987
		JP 57195613 A	01-12-1982
		JP 61053942 B	20-11-1986
		AT 9144 T	15-09-1984
		CA 1199459 A	21-01-1986
		DK 240382 A,B,	29-11-1982
		EP 0066780 A	15-12-1982
		FI 74237 B	30-09-1987
FR 2586650 A	06-03-1987	CA 1268650 A	08-05-1990
		JP 62052055 A	06-03-1987
		US 4812074 A	14-03-1989
EP 531701 A	17-03-1993	US 5247781 A	28-09-1993
		AT 145182 T	15-11-1996
		AU 649854 B	02-06-1994
		AU 2040692 A	11-03-1993
		CA 2073821 A	09-02-1993
		CN 1070376 A,B	31-03-1993
		DE 69215172 D	19-12-1996
		DE 69215172 T	17-04-1997
		DK 531701 T	02-12-1996
		ES 2096682 T	16-03-1997
		GR 3021848 T	28-02-1997
		HK 96697 A	08-08-1997
		JP 5262335 A	12-10-1993
		NZ 243775 A	23-12-1993
		SG 45421 A	16-01-1998